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(54) A dispensing closure for liquid, paste or powder products

(57) A dispensing closure for liquid, paste or powder products is provided on a flexible container (1) and comprises an outlet connection (3) and a pivotable outlet tube (4). A flexible tube (10) is pressed into the outlet connection (3) and passes internally through the greater part of the length of the outlet tube (4) which can be moved through approximately 90° into a closed position, Fig. 2 (not shown), in which the tube (10) is clamped by a shoulder (7) at the end of the outlet tube (4). In this way the tube is completely closed to seal the closure. In other embodiments, flexible tube (10) is twisted to seal the closure, Figs. 5, 6 (not shown), or collapsed axially, Figs. 7, 8 (not shown).

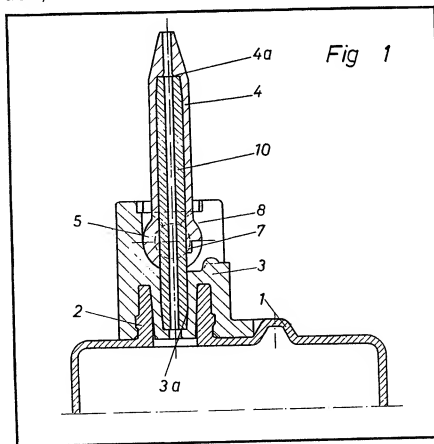
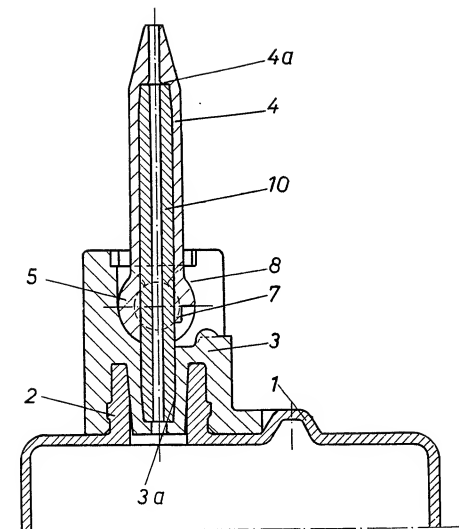


Fig 1



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Fig 3

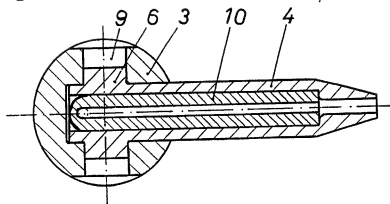


Fig 2

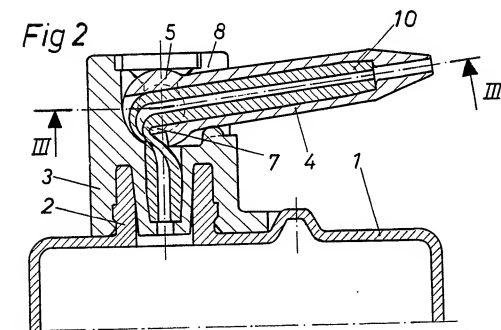


Fig 4

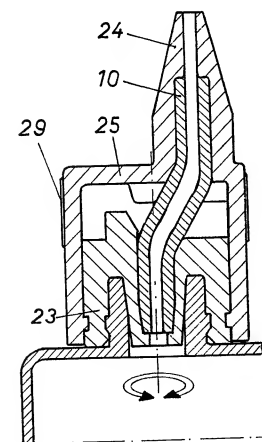
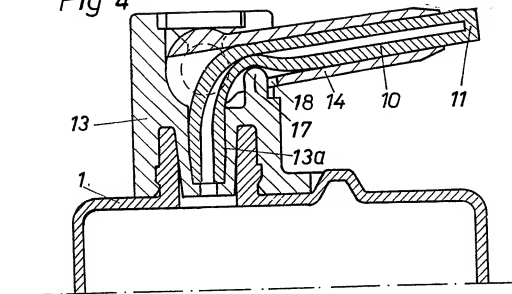


Fig 5

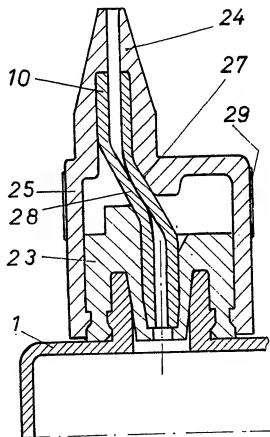
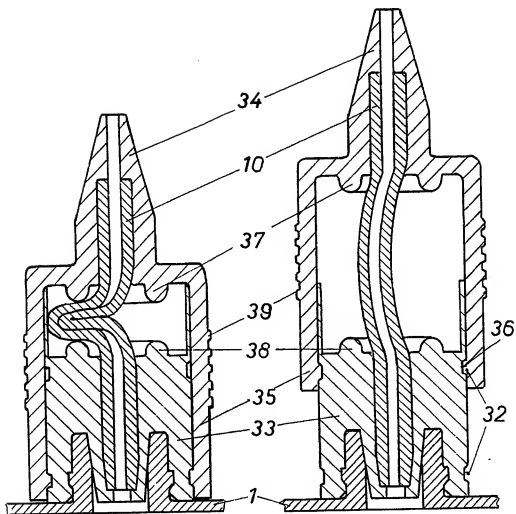


Fig 6

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Fig 8

Fig 7



SPECIFICATION

A dispenser for liquid, paste or powder products

- 5 The present invention relates to a dispenser for liquid, paste or powder products for use particularly in dentistry.
- 10 Existing dispensers of this type have an outlet tube which is connected to a body of the dispenser via a shut-off valve that rotates in a cup formed in an outlet connection comprising a cylindrical bearing through which the centre drilling of the outlet tube runs. In an
- 15 open position the outlet tube is aligned with the outlet opening of the connection, whilst in a closed position the cylindrical bearing of the outlet tube covers the outlet opening.
- 20 In this existing arrangement the various parts of the dispenser are usually made of plastics material and they must be accurately produced in order to adequately seal the dispenser in the closed position. Otherwise the contents of the dispenser, especially if they
- 25 are liquid, can leak from the joint. Even in the closed position liquid droplets may still be able to reach the outlet tube.
- A dispenser leaking in this way is particularly unpleasant and the object of the present invention is to provide a dispenser of
- 30 simple operation and construction and in which the outlet tube is completely sealed in the closed position.
- According to the present invention there is provided a dispenser for liquid, paste or powder products comprising a product container
- 35 defining an outlet, a movable outlet tube fitted to the outlet of the container and adjustable between an open position and a closed position, and a flexible tube which is fitted
- 40 tightly in the outlet and which passes at least partly into the interior of the outlet tube, the flexible tube being closed off when the outlet tube is in the closed position to seal off the
- 45 product container.
- It can be seen that in the present invention the joint between the outlet tube and the outlet connection is not in contact with the product at all so that only in the closed
- 50 position is it necessary to clamp the flexible tube, which in itself is simple. The dispenser according to the invention can be manufactured economically since the joints need not comply with fine tolerances and only a simple
- 55 piece of flexible tube, preferably a silicon tube, is required to produce the desired effect.
- A further advantage results from the fact that one can use a narrow bore tube so that the outlet for the product is of low volume.
- 60 This is important for the following reason: if the dispenser were fitted with a container with flexible walls whereby the product is dispensed by pressing the container, the suction effect created when the flexible container wall
- 65 is released would draw the product from the

outlet tube back into the vessel, thus emptying the outlet tube. This then prevents a leakage of any product remaining in the outlet tube. A narrow bore tube when used in this dispenser produces this effect very easily.

- 70 The present invention will now be described by way of example with reference to the accompanying drawings in which:—

Figure 1 is a cross-sectional view of a first embodiment of dispenser according to the invention with an outlet tube therefore open;

Figure 2 is a view similar to *Fig. 1* but showing the outlet tube in a closed position;

Figure 3 is a sectional view along the line 80 III—III in *Fig. 2*;

Figure 4 is a cross-sectional view of a variation of the dispenser shown in *Fig. 1* with the outlet tube in the closed position;

Figure 5 is a cross-sectional view of a second embodiment of dispenser according to the invention with its outlet tube in the open position;

Figure 6 is a cross-sectional view similar to *Fig. 5* but with the outlet tube in the closed position;

Figure 7 is a cross-sectional view of a third embodiment of a dispenser according to the invention with its outlet tube in the open position; and

95 *Figure 8* is a view similar to *Fig. 7* but showing the outlet tube in the closed position.

Referring to *Fig. 1* and 2, the dispenser is fitted with a flexible container 1 with a circular flange 2 to which is glued or welded an outlet connection 3 in which a pivotable outlet tube 4 is fitted. The opening 3a of the outlet connection has a conical wall and the inner end of a flexible tube 10 is pressed therein and partly protrudes into the outlet tube 4. In this example the tube 10 travels the greater part of the interior of the outlet tube 4 and is connected at its front end to an internal circular shoulder 4a of the outlet tube 4.

The pivoted end of the outlet tube 4 comprises a cylindrical bearing 5 with two diametrically opposite cylindrical lugs 6 (*Fig. 3*) and lies in a cut-away portion 8 of the outlet connection 3 which has two diametrically opposed bearing openings 9 for the lugs 6.

115 These openings 9 form an inner section of longitudinal holes which are open to the outside and directly above the mounting area for the lugs 6 are slightly narrower than the latter so that the outlet tube 4 can be press-fitted into the bearing openings 9, simply by locating the lugs 6.

The cut-away portion 8 is additionally open to one side, in *Figs. 1* to 3 to the righthand side, of the outlet connection 3 so that the outlet tube 4 can be pivoted through approximately 90° from an open position as shown in *Fig. 1* to a closed position as shown in *Fig. 2*. The bearing 5 of the outlet tube 4 is fitted with a cam 7 which runs parallel to the axis of the outlet tube 4 and in the closed position,

shown in Fig. 2, presses the hose 10 against the inner wall of the cut-away portion 8 so as to form a seal. After the outlet tube 4 is moved to the open position the flexible hose 10 takes on a straight shape again, as shown in Fig. 1. This simple method provides a reliable seal for the dispenser without the need for the moving parts of the joint to comply with fine tolerances. Thus the dispenser according to the invention can be mass produced very economically.

The hose 10 preferably consists of silicon rubber and has a relatively small diameter of 1 mm or less, so that the dead space in the outlet is kept low. Thus the liquid remaining in the outlet tube 4 or the flexible tube 10 is drawn back completely into the container 1 so that contamination by leakage is prevented.

In the example shown in Fig. 4 the tube 10 in the closed position is clamped by a projection 17 which protrudes through a cut-away portion 18 of the outlet tube 14. In addition, in this design the outer end 11 of the tube 10 which protrudes through the outlet tube 14 is sealed before the dispenser is first used so that after the dispenser has been manufactured and filled no special securing methods are necessary to prevent accidental operation. Before using the dispenser for the first time the operator need only cut off the outer end 11 of the tube 10.

The opening 13a of the outlet connection 13 in which the tube 10 is pressed is in this case formed in the shape of a double cone.

In the embodiments shown in Figs. 5 and 6 an outlet tube 24 has a hollow cylindrical section 25 at its inner end which is snap fitted to and grips an outlet connection 23 of the container 1 and which can rotate to a certain extent on this connection. In addition the outlet tube 24 is located eccentrically to the outlet connection 23. Shoulders 27 and 28 respectively are provided on the opposite inside walls of the outlet connection 23 and the section 25 of the outlet tube 24, at an angle to the tube 10. The arrangement is such that in the open position shown in Fig. 5 the tube 10 can take on a slightly curved shape, unhindered by the shoulders 27 and 28, whilst in the closed position shown in Fig. 6, in which it is turned through approximately 90° to the axis of the outlet connection 23, the tube 10 is clamped and thereby closed between the two shoulders 27 and 28. For better manual operation the outer surface of the section 25 is ribbed as at 29.

In the embodiment according to Figs. 7 and 8 an outlet tube 34 has at its inner end a hollow section 35 with which it can telescope between an extended open position (Fig. 7) and a retracted closed position (Fig. 8) on an outlet connection 33 which is in turn attached to the container 1. The section 35 locks in both positions, for which purpose locking shoulders 32 are provided on the outer sur-

face of the outlet connection 33 and an inner edge 36 at the bottom end of the section 35 whereby the outlet tube 34 is snap fitted to the outlet connection 33. The inside diameter of the section 35 is greater than the diameter of the tube 10 so that in the closed position according to Fig. 8 this hose can form a side fold. On the opposite inside walls of the outlet connection and the section 35 circular shoulders 37 and 38 are provided to clamp the tube fold in the closed position. In the example shown, the inside diameter of the section 35 is more than three times the tube diameter, so that a fold adequate to ensure a seal is provided. A ribbed area 39 on the outside edge of the section 35 simplifies operation.

A lock in the closed and open positions can also be provided in the other embodiments described above.

The dispenser described can be used advantageously, for example as a replaceable dispenser for a fluorescent solution in an existing diagnostic lamp for fluorescent treatment of teeth to make dental decay visible.

CLAIMS

1. A dispenser for liquid, paste or powder products comprising a product container defining an outlet, a movable outlet tube fitted to the outlet of the container and adjustable between an open position and a closed position, and a flexible tube which is fitted tightly in the outlet and which passes at least partly into the interior of the outlet tube, the flexible tube being closed off when the outlet tube is in the closed position to seal off the product container.

2. A dispenser as claimed in claim 1, in which in the closed position of the outlet tube the flexible tube is clamped by at least one edge defined by the outlet tube and a rim defining the outlet.

3. A dispenser as claimed in claim 1 or 2, in which the outlet tube is pivotable in the outlet and in the open position is at least approximately aligned with the axis of the outlet, whilst in the closed position it is at an angle of substantially 90° to the axis of the outlet.

4. A dispenser as claimed in claim 3 when dependent on claim 2, in which an edge is provided at the pivoted end of the outlet tube which edge is directed towards the pivot formed by the outlet tube in the outlet.

5. A dispenser as claimed in claim 3, in which an edge defining the outlet projects towards the outlet tube and can compress the flexible tube through a cut-away portion of the outlet tube when it is in the closed position.

6. A dispenser as claimed in claim 1, in which the outlet tube can rotate on or in the outlet by means of a hollow cylindrical joint formed at its inner end and located eccentrically to its axis, the flexible tube being clamped between two walls located on the

hollow cylindrical joint and the outlet of which at least one wall forms an edge to compress the flexible tube when the outlet tube is in its closed position.

- 5 7. A dispenser as claimed in claim 1, in which the outlet tube has a hollow joint defining an inside diameter larger than twice the diameter of the flexible tube the outlet tube being mounted telescopically on or in the
10 outlet and can be extended into the open position wherein the flexible tube is at least approximately straight and retracted into the closed position wherein the flexible tube forms a side fold which is clamped between oppos-
15 ing wall sections of the hollow joint and of the outlet, at least one of which wall sections having a ring-shaped edge.

8. A dispenser as claimed in claim 1, in which the flexible tube protrudes from the
20 outer end of the outlet tube and is closed at the outer end before the dispenser is used.

9. A dispenser as claimed in claim 1, in which the outlet tube locks in both the open and closed positions.

- 25 10. A dispenser as claimed in claim 6 or 7, in which the outlet is snap fitted to a connection defining the outlet and is ribbed on its outer circumference.

- 30 11. A dispenser as claimed in claim 1, in which the rim defining the outlet is in the form of a cone or a double cone into which outlet the end of the flexible tube is press fitted.

- 35 12. A dispenser as claimed in claim 1, in which the flexible tube consists of a silicon rubber.

- 40 13. A dispenser for liquid, paste or powder products substantially as hereinbefore described with reference to and as shown in Figs. 1 to 3, or Fig. 4, or Figs. 5 and 6, or Figs. 7 and 8 of the accompanying drawings.